

courtyard, an arrangement which is unique in England. Some interesting mosaics have been found, and near the north gate the remains of an amphitheatre *within* the city walls.

Mr. John Garstang described the Roman fortress *Bremetennacum* (Ribchester), to which an excursion was made in the course of the meeting. Excavations made in 1898-9 have shown that this station was one of a series of fortresses which, with the wall of Hadrian, formed the northern frontier defences of Roman Britain. It is entirely of the earlier character, severely rectangular, with internal buttresses, mural towers, and double-arched gates, and filled within with rows and streets of stone-built barracks and stables.

Mr. Garstang also gave a preliminary account of the Roman fort at Brough, where exploratory excavations have been made quite recently. Like Ribchester, it belongs to the earlier type of fort, and was situated in the favourite position at the junction of two streams. In clearing a deep enclosure within the walls, two inscribed altars were found, and portions of a large inscribed tablet set up by a Prefect of the First Cohort of Aquitani under Julius Verus, Governor of Britain in the time of Antoninus Pius.

The committee on excavations on the Roman site at Gellygaer, near Cardiff, reported that the work was now completed, the results published, and the movable finds installed in the Cardiff Museum.

The committee appointed to report on the excavations at Silchester summarised the last season's work, and strongly urged that, in the small part of the site which remains to be explored, special care should be taken to secure accurate registration of the stratification (if any exists) of the smaller finds, and to investigate the relation in which the rectangular street plan stands to the irregular trapezium of the town wall.

As a result of this and similar recommendations, the Silchester committee of the Association has been reconstituted as a committee "to cooperate with local effort on Roman sites in Britain," and starts work anew with a small grant, to be expended in facilitating special researches of the kind suggested at Silchester, on sites where local or other subscriptions are already providing the funds for a general exploration. The opportunities for work already offered at Silchester on the plant-remains, the frequent occurrence on Roman sites of animal or human bones which need special precautions and expert examination, and the necessity for more detailed and accurate registration of the smaller finds than has been customary hitherto, even in the best conducted excavations, are examples of classes of observation which are only too liable to be neglected by local explorers, and the committee will be doing good service if it can secure for them the attention which they deserve.

### UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

OXFORD.—An examination in mathematics and physics will be held at St. John's College on March 16, 1904, for the purpose of electing a fellow in those subjects. Candidates will be given an opportunity of showing their knowledge of experimental physics. All persons are eligible who shall have passed all the examinations required for the degree of Bachelor of Arts on the day of election (April 20).

CAMBRIDGE.—The general board of studies has issued a report proposing a more comprehensive organisation of geographical studies and examinations in the university. The proposals include the establishment of a board of geographical studies, a geographical education fund, to which the university and the Royal Geographical Society each contribute 200*l.* a year, a special examination in geography for the ordinary B.A. degree, and a diploma in geography for advanced work in the subject. The stipend of the reader in geography is fixed at 200*l.*, and his lectures and those of the other teachers to be employed will be under the direction of the board, on which the council of the Royal Geographical Society will be represented.

A memorial urging the desirability of some similar organisation of anthropological study has been presented by thirty members of the senate, and is at present under the consideration of the council.

Twenty-two candidates have passed the half-yearly examination in sanitary science, and have thus become entitled to the university diploma in public health.

On October 21, 886 freshmen, including 13 "advanced students," were matriculated. The corresponding number for last year was 868.

Mr. F. F. Blackman, St. John's, has been appointed deputy for the reader in botany, Mr. F. Darwin, F.R.S.

The Ven. E. H. Gifford, D.D., senior classic and fifteenth wrangler in 1843, has been elected an honorary fellow of St. John's College.

The grace for the establishment of the Stokes lectureship and the Cayley lectureship in mathematics, for which a temporary endowment was recently offered to the university by certain anonymous donors, will be offered to the senate to-day (October 29).

MR. R. J. T. BRYANT, Leyton Technical Institute, has been appointed organiser of higher education to the Borough of Lowestoft.

It is stated in the *Petit Journal* that Harvard University has come into possession of a legacy of about 5,000,000*l.*, the whole of the estate of the late Mr. Gordon Mackay.

ON the invitation of Yale University, Prof. Sherrington, F.R.S., of Liverpool University, has undertaken to deliver the second series of Silliman memorial lectures next year.

PROF. H. S. HELE-SHAW, F.R.S., has been appointed, through the Colonial Office, to organise technical education in the Transvaal and the Orange River Colony, and to consider the future university scheme of these colonies. The appointment is not a permanent one, and Prof. Hele-Shaw has been granted leave of absence by the council of the University of Liverpool until September next.

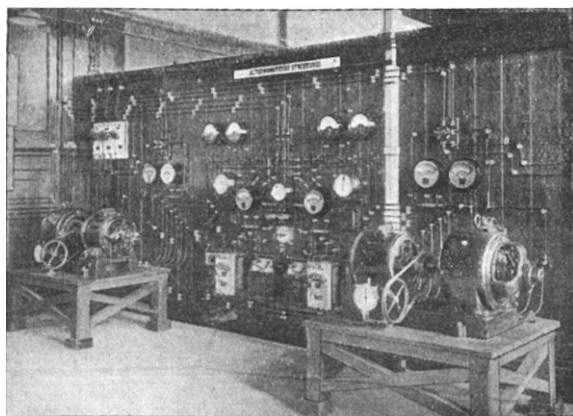
THE County of Essex Education Committee announces that an elementary course of instruction in dairy bacteriology will be given in its biological laboratories at Chelmsford. The course will commence on Thursday, November 5, and will be continued on the ten succeeding Thursdays. The course seems to be a comprehensive one, and should be of considerable value. Normal classes for the training of teachers in natural and experimental science have also been instituted by the committee at Chelmsford. These classes are intended for the practical instruction and training of persons resident in Essex who desire to qualify themselves to teach under the County Council. The classes meet on Saturdays from 10 to 5 o'clock during the winter months.

THE inaugural address to the students of the medical department of University College, Sheffield, was delivered by Sir Michael Foster, K.C.B., on October 15. He directed attention to the variety and complexity of the studies considered necessary for medical students; and he remarked that the question whether the burden was becoming too great for the student, and what things in the curriculum could with advantage be thrown on one side, must be considered, for the least important subjects would have to give way in the future.

THE Home Counties Nature-Study Exhibition will be opened in the offices of the Civil Service Commission, Burlington Gardens, W., to-morrow, October 30, at 3 p.m. Lord Avebury will preside. Admission tickets at special rates can be obtained by teachers and pupils by application to the honorary secretary, Mr. W. M. Webb, 20 Hanover Square, W. The programme includes conferences for teachers on practical methods of nature-study in elementary and secondary schools. The latest scientific developments of the Urban-Duncan microbioscope will be shown on the evenings of Friday and Saturday, and well-known lecturers on natural history subjects, such as Mr. Douglas English, Mr. Richard Kearton, Mr. R. B. Lodge, and Mr. Oliver Pike will give addresses from time to time, and exhibit their slides during the exhibition. Special meetings of the Middlesex Field Club and Nature-Study Society and of the Selborne Society will be held at the exhibition on Monday and Tuesday.

WE have received an admirably illustrated booklet describing the Montefiore Electrotechnical Institute of the University of Liège, and containing a programme of the courses of instruction. In glancing through the illustra-

tions, one is struck by the excellence of the equipment of the laboratories and workshops. We reproduce on a reduced scale an illustration showing the installation for the study of synchronous motors and problems connected with the paralleling of alternators. The character of the wiring is a noticeable feature; the switchboard looks more like a diagram than an actual board, having all the leads plainly visible and easily accessible, which must prove a considerable advantage in teaching and experimental work. The apparatus and machinery installed cover practically the whole field of electrotechnical measurements, a separate



One of the laboratories at the Montefiore Institute.

installation, complete in itself, being provided for the study of each branch. In addition to these "industrial laboratories" there are well-equipped standardising laboratories, chemical and photometric laboratories, drawing offices, and lecture theatres. Altogether the institution appears to be thoroughly equipped for teaching electrical technology.

## SOCIETIES AND ACADEMIES.

### MANCHESTER.

**Literary and Philosophical Society.** October 6.—Prof. W. Boyd Dawkins, president, in the chair.—Dr. Henry **Wilde**, F.R.S., read a paper on the resolution of elementary substances into their ultimates and on the spontaneous molecular activity of radium. The author referred to several of his papers published by the Society on the genesis of elementary substances and on the multiple proportions of their atomic weights, wherein certain gaps appeared in the several series in his tables, which have since been filled up by scandium, germanium, helium, argon, neon, krypton and xenon. The remarkable properties of radium were held to represent further realisations of the predictions made in the author's earlier papers. The author had previously indicated the interruption in the regularity of his multiple series  $H_{2n}$  through the absence of elements of atomic weights 160 and 184 respectively. As there is only one place vacant higher in this series for an analogue of calcium, strontium and barium, radium was identified by the author as the tenth elementary condensation of  $H_{2n}$ , with an atomic weight of 184, and a specific gravity of 4.8, as shown in his tables. The author had shown in former papers that helium was the unknown typical molecule of the same series, with an atomic weight of 2, and had previously indicated the probability of the resolution of the higher members of each series into their elementary typical molecules. The production of helium from radium by Profs. Rutherford, Soddy and Ramsay confirmed the author's prevision in the case of the series  $H_{2n}$ , and this result may lead to the resolution of the higher members of other series into their ultimates.—Fossil plants from the Ardwick series of Manchester, by Mr. E. A. Neville **Arber**. The author has carefully reinvestigated the fossil plants from the Ardwick series of rocks collected by the late Mr. Binney, and which are now in the University Museum of Cambridge. He has also examined the numerous fossil plants from this series in the Manchester Museum, and has come to the con-

clusion that the Ardwick series of rock does not belong, as stated, to the Upper Coal-measures, but forms a definite transition series between the Upper and Middle Coal-measures of Lancashire. Such a transition series has been already recognised in the Coal-measures of South Wales, Somerset, and Staffordshire.

October 20.—Prof. W. Boyd Dawkins, president, in the chair.—Mr. Henry **Sidebottom** read a paper on recent Foraminifera from the coast of the island of Delos, in which he enumerated some seventy species of Miliolidae, including four new species and several interesting variations. The new species and variations were fully described, and drawings both of the specimens and their sections exhibited. Mr. Sidebottom stated that the dredgings from this locality were extraordinarily rich in Foraminifera.

### PARIS.

**Academy of Sciences**, October 19.—M. Albert Gaudry in the chair.—On the state of vaporised carbon, by M. **Eerthelot**. At a temperature of  $1200^{\circ}$ – $1500^{\circ}$ , carbon possesses an appreciable vapour pressure, which is so small that, even after several hundred hours in a vacuum, the amount vaporised amounts only to a few milligrams. This carbon is amorphous, and contains no trace either of diamond or graphite.—On the periods of double integrals and their relations with the theory of double integrals of the second species, by M. Émile **Picard**.—On the estimation of argon in atmospheric air, by M. Henri **Moissan**. Pure metallic calcium, prepared by a method previously described by the author, is used to absorb the nitrogen; this metal also absorbs the traces of hydrogen which are always present if a mixture of lime and magnesium powder has been used in the preliminary treatment. Samples of air from various sources gave, with one exception, very concordant figures between 0.931 and 0.938 per cent. by volume, the exception being a sample of air taken on the Atlantic, which gave 0.949 per cent.—On the products of condensation of tetramethyldiamidophenylloxanthranol with benzene, toluene, and dimethylaniline, by MM. A. **Haller** and A. **Guyot**.—On the acclimatisation and culture of pintadines, or true pearl oysters, on the coasts of France, and on the forced production of fine pearls, by M. Raphaël **Dubois**. Successful experiments have been carried out with *Margaritifera vulgaris*, which has been acclimatised and made to yield pearls which, although small, are of good quality.—On linear equations of finite differences, by M. Alf. **Guldberg**.—On a reflection refractometer, by M. Th. **Vautier**. An interference refractometer composed of three mirrors is described, allowing of the complete separation of the two interfering light bundles.—On the composition of zinc peroxide, by M. **Kuriloff**. The only definite peroxide of zinc appears to be  $ZnO_2 \cdot Zn(OH)_2$ .—The phagocyte organ of the crustacean decapods, by M. L. **Cuénot**.—On the phases of folding in the French intra-alpine zones, by M. W. **Kilian**.—The part played by compression in the localisation of the tendons, by M. R. **Anthony**.—On the relations existing between the Surra and the Nagana, according to an experiment of Nocard, by MM. **Vallée** and **Carré**. The authors confirm the views of MM. Laveran and Mesnil as to the non-identity of Surra and Nagana.—Parthenogenesis and treatment of rheumatism, by M. L. **Pénières**.—Experimental researches on the sense of smell in the old, by M. **Vaschide**. In old people the sense of smell is better preserved in women than in men, but in all cases there is a marked diminution in olfactory sensibility due to age.

### NEW SOUTH WALES.

**Royal Society**, August 5.—Mr. F. B. Guthrie, president, in the chair.—The economic effects of sanitary works, by Mr. J. Haydon **Cardew**. The principal object of the paper was to give municipal and health authorities some basis to work upon in devising sanitary services and forecasting their economic effects.—On the protection of iron and other metal-work, by Mr. William M. **Hamlet**. The author dealt with an investigation of the causes of the rapid rusting away of the iron casing at one of the Australian artesian bores, where abundance of carbonic acid gas was evolved at  $100^{\circ}$  F.; the water also contained alkaline carbonates and bicarbonates with sodium chlorides, silica, &c., amounting to between thirty and forty grains of total solid matter to the gallon. Probably a specially hard and resistant alloy